REMARKS

Applicant respectfully requests the Examiner's consideration of the present application, as amended.

Summary of Office Action

Claims 37-60 are pending.

Claims 37-48, 55, 56, 57, 58, and 60 are allowed.

Claims 54 and 59 were rejected under 35 U.S.C. § 112, first paragraph

Claims 49, 51, and 52 were rejected under 35 U.S.C. § 103 in view of U.S. Patent No. 5,287,292 of Kenny, et al. ("Kenny").

Claims 50 and 53 were rejected under 35 U.S.C. § 103 as being unpatentable over Kenny in view of U.S. Patent No. 4,789,819 of Nelson ("Nelson").

Summary of Amendments

Claims 49 and 51 have been amended. Applicant respectfully submits that support for the amendments is found in the specification including the claims as originally filed and the drawings. Applicant respectfully submits that the amendment to claims 49 and 51 does not add new matter.

Response to rejection under 35 U.S.C. § 112, second paragraph

Claims 54 and 59 were rejected under 35 U.S.C. § 112, first paragraph. In particular, the Examiner stated:

> Specifically the situation is not disclosed in the specification of varying a clock frequency of the clock signal in *response* to a first and second threshold signal.

(12/23/97 Office Action, p. 2)(*emphasis added by Examiner*)

Applicant respectfully submits claim 54 includes the following language:

> 54. A method of controlling a frequency of a clock signal which drives a microprocessor, comprising the steps of:
>
> a) generating a temperature signal within the microprocessor corresponding to a temperature of the microprocessor;
>
> *b) generating a first threshold signal if the temperature signal indicates that the microprocessor temperature exceeds a first threshold temperature;*
>
> *c) generating a second threshold signal if the temperature signal indicates that the microprocessor temperature exceeds a second threshold temperature; and*
>
> *d) varying a frequency of the clock signal in response to at least one of the first and second threshold signals.*

(Claim 54)(*emphasis added*)

Applicant respectfully refers the Examiner to pages 23-26 and Figures 7-8. Clearly, the specification describes generating a comparison signal or "interrupt" when the microprocessor attains a threshold temperature. In response to the interrupt "processor unit 705 generates a clock control value for the PLL circuit 720. The clock signal value reduces the microprocessor system clock frequency. If the interrupt is again generated in response to the microprocessor 700 attaining the new threshold temperature value, the microprogram 740 writes a new temperature threshold value to the internal register 735, and the processor unit 705 further reduces the microprocessor system clock frequency." (Specification, p. 24, line 26 thru p. 26, line 2)

Thus support exists for generating a first threshold signal (i.e., "interrupt") if the temperature signal indicates that the microprocessor exceeds a first threshold temperature (Specification, page 24, line 26 thru page 25, line 2; Fig. 8). Similarly, support exists for generating a second threshold signal (i.e., "interrupt") if the temperature signal indicates that the

microprocessor temperature exceeds a second threshold temperature (Specification, p. 25, lines 5-20). Moreover, support is found for varying the frequency of the clock signal in response to at least one of the first and second threshold signals (Specification, p. 25, lines 12-20).

Thus applicant respectfully submits claim 54 is patentable under 35 U.S.C. § 112, first paragraph.

Claim 59 includes the language:

> 59. A microprocessor comprising:
> a processor unit;
> a clock circuit providing a clock signal to the processor unit, the clock signal having an associated frequency;
> a thermal sensor generating a temperature signal corresponding to a temperature of the microprocessor;
> logic circuitry coupled to the thermal sensor, *the logic circuitry generating a first signal if the temperature signal exceeds a first threshold level and a second signal if the temperature signal exceeds a second threshold level; and*
> *means for varying the associated frequency of the clock signal in response to at least one of the first and second signals.*

(Claim 59)(*emphasis added*)

Applicant respectfully submits the arguments presented with respect to claim 54 similarly apply with respect to claim 59. The specification describes a programmable thermal sensor including a thermal sensor and logic circuitry capable of being programmed with different threshold values. The programmable thermal sensor generates a first signal (interrupt) if the temperature signal exceeds a first threshold level. The programmable thermal sensor generates a second signal (interrupt) if the temperature signal exceeds a second threshold level. The specification describes means for varying the frequency of the clock signal in response to at least one of the first and second signals (Specification, p. 24, line 26 thru p. 27, line 12).

Thus applicant respectfully submits claim 59 is likewise patentable under 35 U.S.C. § 112, first paragraph.

Applicant respectfully submits the amendments under 35 U.S.C. § 112, first paragraph have been overcome.

Response to 35 U.S.C. § 103 rejections

Claims 49, 51, and 52 were rejected under 35 U.S.C. § 103 in view of Kenny. Claims 50 and 53 were rejected under 35 U.S.C. § 103 as being unpatentable over Kenny in view of Nelson.

Applicant respectfully submits claims 49-53 are patentable under 35 U.S.C. § 103 in view of the cited references. In particular, none of the references, alone or combined, teaches or suggests a method of controlling a temperature of a microprocessor wherein the microprocessor performs the steps of comparing a temperature signal generated within the microprocessor with a first threshold temperature level within the microprocessor.

With respect to Kenny, the Examiner has stated:

> As per claim 49 the Kenny patent teaches a method and apparatus for regulating the heat in the integrated circuit, specifically generating a temperature signal within the microprocessor indicative of the temperature of the microprocessor (summary of the invention, .. "when the temperature monitor indicates that the temperature of the microprocessor..." col. 1 and col. 2, lines 65-68, 1-2), comparing the temperature signal with a first threshold temperature within the microprocessor (col. 9, lines 30-37)

(11/03/97 Office Action, p. 3)

Applicant respectfully traverses the Examiner's characterization of Kenny and refers the Examiner to the very portions of Kenny are cited.

Kenny includes a disclosure of a heat regulator for integrated circuits. The temperature of the integrated circuit is either 1) measured directly with a

temperature monitor, or 2) indirectly estimated from a measure of the activity of the integrated circuit. (Kenny, col. 1, line 51 thru col. 2, line 2).

Appellant respectfully submits Kenny does not teach or suggest generating a temperature signal within the microprocessor indicative of the temperature within the microprocessor as alleged. Moreover, the temperature monitor is external to the microprocessor not internal to the microprocessor thus any signal generated by the temperature monitor is not generated within the microprocessor (or even provided to the microprocessor).

To the contrary, with respect to the "direct method" the threshold temperature is determined by the voltage divider network 501 (external to microprocessor). The trigger value ("threshold value") is established within the power use regulator which is also external to the microprocessor. Thus the temperature signal is generated external to the microprocessor (not within as alleged), the threshold value is maintained in the power use regulator (not within the microprocessor) and the comparison of the threshold value with the temperature signal is performed by the external power use regulator, not by or within the microprocessor.

The cited portion of col. 9 is in reference to a technique ("indirect method") other than the use of the temperature monitor. The "temperature signal" of the indirect method is not really even a temperature signal nor is it compared to a threshold temperature. To the contrary, the "temperature signal" is merely a count reflecting how long the microprocessor has been running at one frequency as opposed to another frequency. The "temperature signal" is not generated within the microprocessor, the "threshold value" that the temperature signal is compared to is not stored within the

microprocessor, nor is the comparison between the threshold value and the temperature signal performed by or within the microprocessor.

Applicant therefore respectfully submits Kenny does not include a disclosure of a method of controlling a temperature of a microprocessor including the step performed by the microprocessor of comparing a temperature signal generated within the microprocessor with a first threshold temperature level within the microprocessor.

In contrast claims 49 and 51 include the language:

> 49. A method of controlling a temperature of a microprocessor, wherein the microprocessor performs the steps comprising:
> a) *generating a temperature signal within the microprocessor indicative of the temperature of the microprocessor;*
> b) *comparing the temperature signal with a first threshold temperature level within the microprocessor;*
> c) generating an interrupt signal if the temperature signal indicates that the first threshold temperature level has been exceeded; and
> d) decreasing a microprocessor clock frequency in response to the interrupt signal.

(Claim 49, as amended)(*emphasis added*)

> 51. A method of controlling a temperature of a microprocessor, wherein the microprocessor performs the steps comprising:
> a) *generating a temperature signal within the microprocessor corresponding to the temperature of the microprocessor;*
> b) *comparing the temperature signal with a first threshold temperature level within the microprocessor;*
> c) generating an interrupt signal if the temperature signal indicates that the first threshold temperature level has been exceeded; and
> d) activating an active cooling device to decrease the microprocessor temperature in response to the interrupt signal.

(Claim 51, as amended)(*emphasis added*)

Thus applicants respectfully submits claims 49 and 51 are patentable under 35 U.S.C. § 103 in view of Kenny.

Nelson was cited only with respect to teaching a fail-safe temperature threshold with respect to dependent claims 50 and 53. However, given that claim 50 depends from claim 49 and claims 52-53 depend from claim 51, applicant respectfully submits dependent claims 50, 52, and 53 are likewise patentable under 35 U.S.C. § 103.

Applicant respectfully submits the rejections under 35 U.S.C. § 103 have been overcome.

Conclusion

Applicant respectfully submits that in view of the arguments set forth herein, the applicable rejections and objections have been overcome. Accordingly, all of claims 37-60 should be found to be in condition for allowance.

If there are any issues that can be resolved by telephone conference, the Examiner is respectfully requested to contact the undersigned at **(503) 684-6200.**

If there are any additional charges associated with this communication, please charge Deposit Account No. 02-2666.

Respectfully submitted,
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